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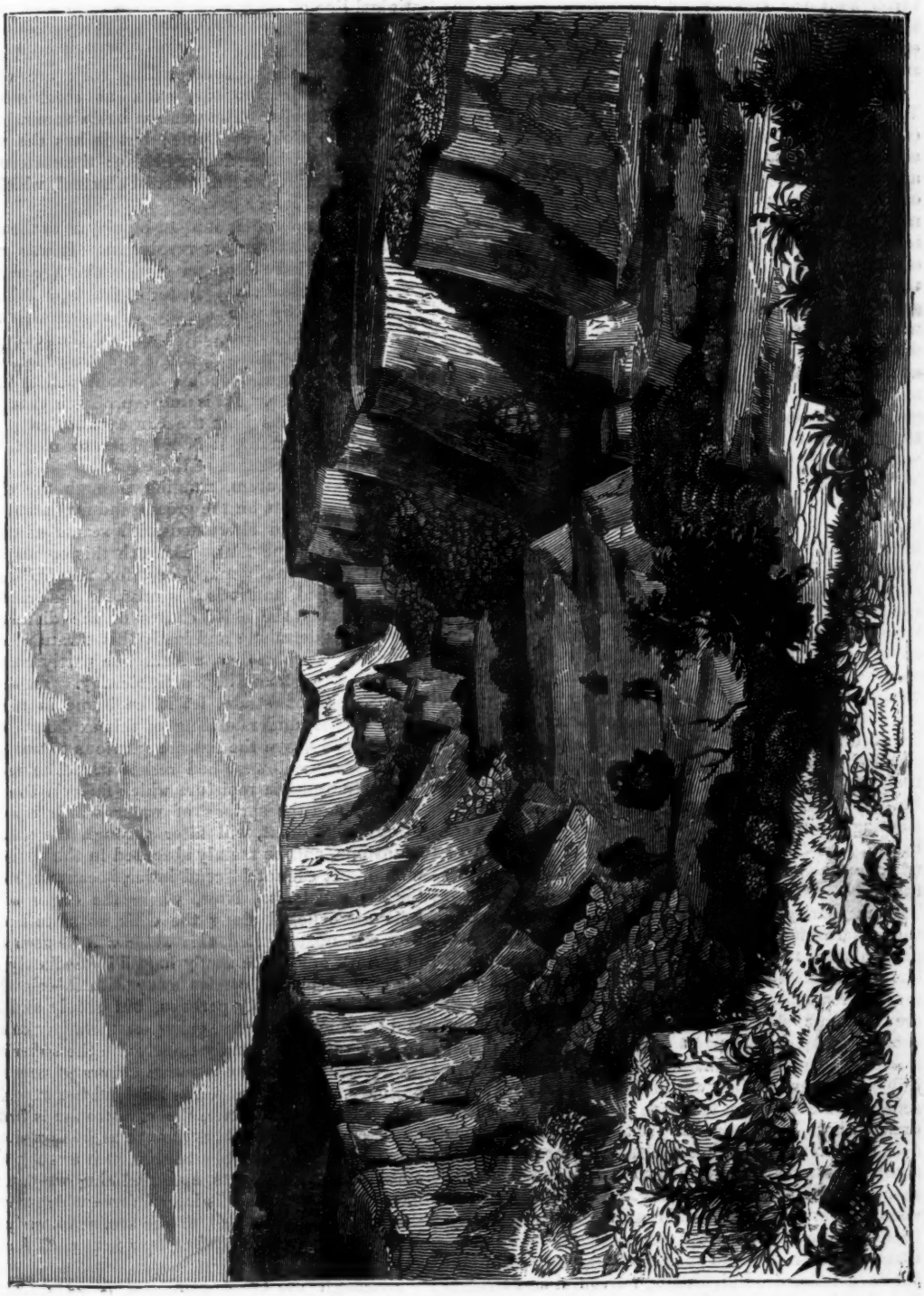


VIEW OF THE LAND-SLIP NEAR AXMOUTH, DEVON, LOOKING TOWARDS THE EAST.

EXTRAORDINARY CONVULSION AND LAND-SLIP;

NEAR AXMOUTH, DEVON.

THE convulsion of which we now give a brief description, occurred on the south coast of Devonshire, at the distance of two miles east of the mouth of the river AX, and the town of Seaton, and about one and a half south-east from Axmouth village. We will not enlarge on the geological interest it has excited throughout the country, or the curiosity which has been evinced by the thousands of persons who have crowded to examine it, but enter at once on the subject.

It commenced at three o'clock in the morning of Tuesday, the 24th of December, 1839, when the family of Mr. Chapple, who occupies the farm of Dowlands about half a mile distant, was aroused by a crushing and low rumbling sound. Nothing, however, further occurred until four o'clock on the morning of Christmas Day, when some labourers of the farm, who tenanted two cottages built on the slope of the debris of the undercliff, were awakened by noises similar to that which had been heard the night before. On getting up and endeavouring to open the door, the man who dwelt in one of them, discovered that it was so wrenched and distorted, that he could not accomplish his purpose without violence and the assistance of a crow-bar. He then saw that the ground was sinking beneath him—that it was subsiding in terraces towards the sea—that it was gaping with fissures—and that the walls of his dwelling were cracking and tottering as if ready to fall. He then hastily got his family out, and proceeded to his landlord and gave the alarm, for no one knew how far it would go, or where end. During the whole of Christmas Day the disruption continued; making a roaring and grinding noise resembling some kinds of thunder, and causing the earth to tremble at a great distance from the actual disturbance. An immense tract, extending east and west one mile in length, and many hundred feet in width, subsided or sank down so as to form a ravine or chasm more than two hundred feet in depth. Parts of several fields, included in this area, descended with great regularity and precision; so that their surfaces, still bearing their crops, are now at the bottom not much broken up, and only thrown into a slanting position, instead of being level, as they were before. The hedges which divided these fields can be traced on along the fallen portions, as well as across the high country which has remained unmoved. This regularity however, is not universal. Towards the eastern and western extremities of the chasm—particularly towards the former—the devastation has been extraordinary and complete. Columnar masses, resembling vast pinnacles or towers of chalk, are in some places left standing, whilst the more broken and crushed parts have sunk around them: immense banks of flint and broken rock rise in hillocks on every side, whilst the ground is rent and scored in seams many feet wide and deep. An entire orchard is to be seen in one part, which has descended to a level much lower than it before occupied: some of its trees are overthrown and uprooted, whilst many others are still standing, and will bear fruit next season. A wood of forest trees has also been broken up in the same way: the cottages before mentioned are in ruins, and their gardens destroyed: and the devastation around, although dreadful and terrific, is full of beautiful grandeur.

This chasm, however, is but one moiety of the phenomenon. It ranges east and west, and parallel with the sea shore: and in running through the district, cuts off from the main land a portion of the original country measuring one mile in length by half a mile in width. This huge mass, so cut off, has been forced on its foundation many yards in a southerly direction towards the sea, inclined somewhat from its former level, and rent and depressed into terraces. The bed of the sea also, the whole way along in front of it, has been lifted up to the height of forty feet above the surface, to a great distance out from the original line of coast, now forming reefs and islands, inside which are bays and small harbours, into which boats have been, and have found good soundings. These reefs of thrown-up rock are covered with marine productions, such as corallines, seaweeds, and shells. The western basin somewhat resembles the Cobb at Lyme; but it has the advantage over it in being larger in size: the eastern basin is entered through a long narrow channel, which then widens into a larger bay.

We must now enter into an inquiry as to the causes of so vast and violent a revolution. It was at first supposed to have been an earthquake, according to the usual acceptation of the term, that is, a dislocation of the earth by the agency of subterranean fire. A closer examination, however, of the component materials of the district, and a mature consideration of other accessaries acting thereon, will incline to decide otherwise. It is most probable that water, and not fire, has been the cause; and, in order to make this apparent, it is requisite to mention the geological construction of these hills.

The upper stratum, running through the cliffs, is chalk. This rests on the green-sand formation, much consolidated, and alternated with seams of chert, a species of opaque flint. Beneath this comes a deep bed of loose, sandy marl, or "fox mould," as it is locally termed, and it is this unstable and friable soil that contains the chief causes of the disturbances under consideration; and lastly this stratum is supported by the blue lias, a formation partly composed of beds of tough and impenetrable clay. These being the component strata, let it be borne in mind, in order to the understanding of this explanation, that all the soils above the lias are pervious to water, but the clay in the lowest bed resists it. The rain and other atmospheric moisture which falls on the upper surface, and the springs of water which may tend towards one point, will filter through the chalk and sandstone, and be mainly absorbed in the spongy fox mould. It cannot descend lower, because the clay of the lias resists it. Now, where the edges of these soils are exposed along the cliffs, so as to lay them bare and unsupported, this water will be seen oozing in springs out of the sandy mould immediately above the clay—which it carries away with it—slowly and almost imperceptibly perhaps, but surely and inevitably. Such a process, going on through the course of ages, must necessarily undermine the superincumbent strata; and when a season occurs more wet than ordinary, and such indeed as England has experienced during the past summer, the catastrophe is hastened on with a sudden crash, even such as we now describe. The precipitate and violent subsidence of such a great mass, had power, by its overwhelming weight, to act laterally, and it was this lateral force which served to thrust upwards the bed of the sea, previously seven fathoms beneath the surface, now into reefs forty feet above.

Although the effect produced is as terrific and ruinous as if the fires of Vesuvius had been the agent, yet we have endeavoured to show that fire had indeed no part in it. Several other places on the south

coast of England exhibit the remains of similar convulsions, wrought, without doubt, in a similar way, but in what age it is impossible to say, as no record of such an occurrence exists to inform us. The Undercliff in the Isle of Wight may be instanced as one; the Pinhay Cliffs, only three miles east of Culverhole Point (the subject of this paper) as another; and a third on the cliffs between Beer and Branscombe. It is not a little remarkable that Providence should not have suffered a single life to be lost during so great a revolution, although it commenced in the middle of a dark night, when the inhabitants of the two cottages which were shortly reduced to utter ruin, were in their beds.

The concourse of persons which has flocked to the scene of devastation is incredible; many thousands have been there, congregated from almost every county in the kingdom, even the most distant. The crops of the two farms which have suffered (that is, Dowlands and Little Bendon,) were getting so spoilt and trodden down by these visitors, that the tenants, in order to save something from the wreck, and in some sort remunerate themselves, held it necessary to levy a toll of sixpence per head on all trespassers. In this way it is supposed that they are reaping a silver harvest, far richer even than if the catastrophe had never occurred. The crowds during the first week were too numerous to be counted.—PETER.

A WARNING.

VACCINATION was introduced into Ceylon, an island off the southern point of the Peninsula of India, in the month of August, 1802, for, "this devoted island had, in former years, been the scene of frightful devastation from the small-pox, which carried such terror into the minds of the natives, that, in several instances, upon the occurrence of this disease in a town or village, all the inhabitants fled, voluntarily incurring the miseries of hunger, and leaving their homes to be overrun by the wild beasts of the forest, rather than wait the attack of this still more fearful enemy."

But, the plague was stayed; in January, 1806, being *five years and a half from the introduction of vaccination, the small-pox was extinct throughout the whole of the British possessions in Ceylon.* From 1806 till the year 1810 a few scattered cases of the disease occurred, but from this date till 1819, small-pox was quite unknown.

This, however, was a fatal calm, for parents had neglected to use for their offspring that means of protection which had secured themselves from the ravages of this frightful disorder, and in July, 1819, the small-pox returned with redoubled violence. As security had begotten apathy, so now, danger and death frightened the poor Ceylonese into using the easy alternative, vaccination. We give these simple facts of history without one word of comment, believing that they must tend to allay the fears of those who have already sheltered their home, under this great discovery, and hoping that they will excite the fears of those who, from whatever cause, still neglect to use the proper means of safety to themselves and others; means which can do no harm, but which, even in the life-time of Dr. Jenner, saved more lives than Napoleon lavished, and of the importance of which Napoleon himself judged so highly, that the name of Jenner was a passport on the Continent, and prisoners were released at his intercession.

THE highest learning is to be wise, and the greatest wisdom is to be good.—MARCUS ANTONINUS.

ON THE IVORY STATUES OF THE ANCIENTS.

THE fairness and beauty of ivory is such as to cause it to be sought after and valued by all the most civilized nations of the earth; by all people, in fact, who have a taste for ornament, and a capacity for producing it. The delicate texture of ivory, its pleasing colour, and its high polish, have furnished the poets and writers of imagination with beautiful tropes and similes, and the merchant with a source of traffic, from the remotest ages of antiquity.

Homer speaks of the Trojans using ivory in the make of the bit of a horse's bridle, which must have been 1200 years B.C. After this, as the commerce of Phœnicia enlarged itself, ivory became one of the staple articles of commerce. "*Horns*" or tusks "*of ivory*," are thus referred to by the prophet Ezekiel, xxvii. 15. About two hundred years after the Trojan war, the trade in ivory received the attention of the Israelites, under King Solomon. Soon after the time of Solomon, we read of houses and palaces made of this costly and luxurious material; luxurious for its elegance and beauty, costly for its comparative scarcity, if then obtained only from the teeth and tusks of elephants captured in Central India. The ivory was sent, at a great labour and expense, overland, or by a tedious coasting voyage by sea. In addition to Solomon's throne, which was made of ivory, we read also of "beds of ivory," and "vessels of ivory," but they are referred to by the Sacred Writers, as characteristic of worldly greatness and luxury.

When ivory was thus extensively employed in other nations, it is not to be wondered at that the manufacture of works of ivory should have been common among the Greeks. From some sources we learn that the father of Demosthenes, the celebrated orator, had a manufactory for making knife-handles of this material. His proper profession was that of a smith or cutler. In addition to this, his dealings in ivory were so large, that he supplied others as a wholesale merchant. But the employment of ivory in the domestic concerns of the Greeks does not demand our attention so much as its use in the construction of certain vast and colossal STATUES, such as that of which a view is given to the notice of the reader, on the following page.

These statues were termed *chryselephantine*, that is, composed of *gold* and *ivory*.

The great master of the art of working statues in ivory was PHIDIAS. The circumstance which led to the erection of the statue of the Olympian Jupiter was as follows. Phidias had made a statue of Minerva, at the request of Pericles, which was placed in the Parthenon at Athens. It was of ivory and gold, and measured thirty-nine feet in height. On the summit of the helmet of the goddess was a sphinx, and on each side of it were griffins. The figure was erect, with a robe reaching to the feet. On the breast was the head of Medusa, formed in ivory; in one hand a figure of Victory, four cubits in height, in the other hand a spear, with a shield at her feet. There was more gold than ivory in this statue; but the eyes, the face, the feet, and the hands were of ivory. The gold used in the statue was so disposed that it could be taken off and weighed at any time, if the honesty of any of the attendants of the temple were implicated.

The execution of this splendid work raised Phidias many enemies, and he was accused of having carved his own image and that of Pericles, his patron, on the shield of the statue of the goddess, in such a way that if any one were to remove his figure from the

shield, the whole would fall to pieces. For this he was banished from Athens by the clamorous populace. He retired to Olympia, a town of Elis, in the Peloponnesus, where he determined to revenge the ill-treatment he had received from his countrymen, by making a statue which should eclipse the fame of that

STATUE OF JUPITER, BY THE GREAT SCULPTOR PHIDIAS.

of Minerva. He was successful in the attempt, and the statue which he made of JUPITER OLYMPIUS was always reckoned the best of his productions, and has passed for one of the wonders of the world. The people of Elis were so sensible of his merit, and of the honour he had done their city, that they appointed his descendants to the honourable office of keeping clean this magnificent statue, and of preserving it from injury.

The statue of Jupiter was about sixty feet in height. The god was represented sitting upon a throne, which, like the statue, was of ivory and gold. He wore a crown upon his head, in imitation of a branch of the olive-tree, and in his right hand was a figure of Victory, also of gold and ivory, with a fillet in its hand, and crown upon its head. His left hand held a long and beautiful sceptre, made of different metals, on the top of which was the figure of an eagle. The sandals and robe of the deity were of gold, and on the latter were richly strewn the figures of animals and flowers, particularly lilies. The throne was bedecked with gold and precious stones, and inlaid with ebony and ivory: it was also ornamented with pictures and sculptures of animals and statues; four figures of Victory, in a dancing attitude, being represented at the four feet. Two other Victories stood at the feet of the god, and the pedestal, upon which the whole rested, was adorned with mythological compositions.

The statue of Jupiter, thus constructed in a sitting posture, and of such dimensions, touched almost the summit of the roof of the temple, so that it appeared that if the god had risen up, he would have lifted up the roof. The figure of Jupiter sitting is represented on several silver coins made in the time of Alexander the Great, and his successors. Pausanias, a Greek writer, about 170 A.D., tells us that "the skill of Phidias received the testimony of Jupiter himself. The work being finished, the artist prayed the god that he would make known if he were satisfied, and immediately the pavement of the temple was struck with lightning at the spot where in my time stands a vase of bronze." Such was the legend devised and published by the heathen priests, in order to bow down the people of the most polished and civilized countries of antiquity, before this colossal type of idolatry. However advanced in worldly skill and wisdom the ancients may have been, at any time or place, they were immensely behind those who derive their spiritual knowledge from the Scriptures of Truth, which aid and confirm our more enlightened reason, in the solemn and unexceptionable position that "we ought not to think that the Godhead is like unto gold, or silver, or stone, graven by art or man's device."—Acts xvii, 29.

It appears that this image continued for several ages to assist the illusions of a false religion, for we are told that in the time of the Roman Emperor Antoninus, A.D. 160, the fame of this great work drew crowds of worshippers to Elis, it being generally considered to be a personal misfortune, if any one died without seeing it. That the statue, which was made of a material not very durable, should continue so long sound and entire, was due to its being regularly cleansed and rubbed with oil, and so preserved from the consumptive effects of damp. The statue existed as late as the year A.D. 370.

When speaking of ivory statues, thirty or sixty feet in height, and proportionate in all their parts, it must naturally occur to the reader to ask whence the ivory for such enormous figures was obtained; for many such ivory statues were made in different parts of Greece, by other artists besides Phidias. Without replying directly to this question, we must take into consideration what appears to have been the *mode* of structure used in erecting these statues.

M. Quatremère de Quincy has written much that is learned and ingenious on this subject. According to his opinion the statue need not, nor could it have been of *solid* ivory throughout its diameter, not from the difficulty of getting a sufficient supply of the material, but from observation of the form of the elephant's tusk, which is partly hollow and partly solid: but Quincy thinks, however, that the ancients were able to obtain tusks of larger dimensions than those usually seen at the present day. According to his theory or opinion, an art existed formerly of rendering the cylindrical part of the tusk flat when cut through lengthwise, and flat plates were thus procured, from about six to twenty-four inches in width. After this, he imagines that, a block of wood having been shaped as a sort of mould for the ivory, the individual plates were fixed upon it, after being cut and polished in exact resemblance to the corresponding portions of a model previously executed.

As the ancients were in the habit of constructing not only vast images of ivory for religious purposes, but of using this substance very profusely in making friezes, doors, porticoes, &c., as well as for many of the household conveniences of life, their supply must have been much larger than that which is available to the moderns. From the abundance of the fossil

remains of elephants in various parts of the world, it has been inferred that this race of animals was more numerous formerly than now. This inference is likewise considerably strengthened by the testimony of history to the vast number of elephants formerly used in battle, and slain for sport on the arena of the Roman Circus. It is further remarkable that fossil remains of elephants have been, and still are, constantly found in all parts of the earth, where now the elephant does not exist, and such fossil remains have not been discovered in those regions in which this animal is now naturalized. Lastly, fossil remains of certain huge species of elephant have been dug up, which species now exist nowhere. From all this we conclude that the elephant was once a commoner animal in almost all the regions of the ancient world than it now is, and that the supply from animals caught and domesticated, as likewise from the fossil remains just alluded to, the wrecks, perhaps, of antediluvian times, was amply, or more than, sufficient for all the sacred and profane purposes to which this material was anciently applied.

They say that the goodliest cedars, which grow on the high mountains of Libanus, thrust their roots between the clifts of hard rocks, the better to bear themselves against the strong storms that blow there. As nature hath instructed those kings of trees, so hath reason taught the kings of men to root themselves in the hardy hearts of their faithful subjects. And as those kings of trees have large tops, so have the kings of men large crowns, whereof as the first would soon be broken from their bodies, were they not underborne by many branches, so would the other easily totter, were they not fastened on their heads with the strong chains of civil justice and martial discipline.—Sir Walter Raleigh.

Let every mother consider herself as an instrument in the hand of Providence,—let her reflect on the immense importance the proper education of one single family may *eventually* prove! and that, while the fruit of her labours may descend to generations yet unborn, she will herself reap a glorious reward;—let her behold our children rich in intellectual and moral worth, their desires regulated by virtue and religion, their passions under the control of reason, and their hearts in the possession of that "peace which passes understanding;"—let her see them ennobled by that species of superiority which alone commands the reverence of the heart, and enjoying that true dignity which confers the only real distinction;—let her imagine her children bedewing her tomb with tears of filial affection and gratitude, and even in the latest hour blessing her memory as the cause of that happiness which has marked their path on earth, and as the conductor to that hope which sweetens the hour of dissolution.—Miss Hamilton.

The unanswerable reasonings of Butler never reached the ear of the gray-haired pious peasant; but he needs not their powerful aid to establish his sure and certain hope of a blessed immortality. It is no induction of logic that has transfixed the heart of the victim of deep remorse, when he withers beneath an influence unseen by human eye, and shrinks from the anticipation of a reckoning to come. In both the evidence is within, a part of the original constitution of every rational mind, planted there by Him who framed the wondrous fabric. This is the power of conscience; with an authority, which no man can put away from him, it pleads at once for his own future existence, and for the moral attributes of an omnipotent and ever-present Deity. In a healthy state of the moral feelings, the man recognises its claim to supreme dominion. Amid the degradation of guilt, it still raises its voice and asserts its right to govern the whole man; and, though its warnings are disregarded, and its claims disallowed, it proves within his inmost soul an accuser that cannot be stilled, and an avenging spirit that never is quenched.—Dr. Abercrombie.

A DISCOURSE ON GEOLOGY.

III.

The Utility of Geology.

The day is perhaps almost past, for questions to be mooted as to the utility of general science: its practical application has been of such importance, so available to various economical purposes, within the last half century, that on this subject we shall scarcely meet with a dissentient voice. The value of geology, however, on account of its comparative newness and its being therefore, less generally known is, perhaps, less acknowledged than it merits. It may be interesting to adduce a few instances of its practical application, and in attempting this, we cannot do better than adopt the language of an eminent geologist, from whose writings we have already made some extracts.

"The geologist," he observes, "can confer on mankind benefits of no mean order; can assist the farmer to fertilize the surface of the earth, so that two blades of grass shall grow where one grew before, and can impart system to the labours of the miner, so that, no longer groping his way in the dark, he may prosecute with confidence and with an approach to certainty, those costly operations which are necessary, in order to extract from the earth the treasures which have been there stored up for our use.

"The mineral wealth of the earth has not been distributed through it at random; but each formation (as geologists call a group of strata,) is, over extensive areas at least, the peculiar receptacle of certain minerals.

"In the present state of our knowledge, it is too much to affirm that these general rules prevail over the whole earth; but they hold good over extensive portions of the earth's surface, though, even within those areas, there are exceptions to the rule; and the study of the rule and the exception is alike profitable. Let us take for example the case of coal. Deposits of vegetable matter occur in formations of all ages, but they occur only in thin seams, and in small quantities. The great coal-deposit lies between two formations known by the names of the old and the new red sand-stones, closely resembling each other in mineral composition, though very different in their zoological characters. The coal-fields of Brora, in Scotland, and of Whitby, in Yorkshire, can scarcely be called exceptions, though they are situated in a newer group of rocks, called the oölitic. For they afford an inferior kind of non-bituminous coal, worked only to supply a local demand. In communicating these facts we are obliged to anticipate the knowledge of our readers as to the order in which the strata succeed each other,—

Things by their names we call, though yet unnamed,

and therefore, perhaps, they can scarcely perceive the full import of these remarks.

"Now, the practical results to be derived from a knowledge of this general rule and its exceptions, are these: That searches for coal ought only to be undertaken with the greatest caution, and under peculiar circumstances, in strata beyond the limits of the regular coal-strata; the working of them may sometimes be attended with success in districts which are ill-supplied with coal from the coal-measures properly so called. The same remark applies to the lignite, or wood-coal, of the tertiary strata, which is wood partially carbonized, affording a very inferior fuel, which would never be used where the produce of the coal-fields of Newcastle, or Staffordshire, or South Wales, could be easily obtained. In England, which is so abundantly supplied with coal of the best description,

lignite occur but sparingly, but on the Continent it is sometimes largely developed, and extensively worked.

"Copper is not generally met with in strata more recent than the old red sand-stone; but there are in England some exceptions to this rule:—the celebrated Ecton mine, in Staffordshire, and the Llandidno, or Orme's Head mine, in Caernarvonshire, being situated in the carboniferous limestone. On the Continent, the ore of this metal is worked in a formation even still more recent, the copper-slate of Thuringia being a portion of the new red sand-stone series. The advantages to be derived by the practical miner from a knowledge of these facts are obvious. On the one hand, the general rule will prevent a waste of capital, in fruitless searches for certain minerals in strata where they rarely occur, and on the other hand, the exceptions will prevent that slavish adherence to the general rule, which would prohibit all attempts to work them in those strata, when the indications are in other respects favourable; and Geology furnishes us with means for discriminating the different strata, and teaches us their order of succession; so that having ascertained to what part of the series a given rock belongs, we know what other rocks we may expect to find to find above and below it.

"Mineral veins, again, are not equally productive through all parts of their course, but masses, or 'bunches,' as they are called, of ore, are locally distributed through the vein, being connected by thin strings of ore, or by barren portions of the vein-stone, which are only useful as guiding the miner to the richer deposits. His object, therefore, is to arrive at the productive portions of the vein, with the expenditure of the least possible labour; and this object he attains by observing the circumstances under which these bunches occur in those particular veins on which he is employed, till by repeated observations, he discovers the laws which they follow, and knows those parts of a vein which are likely to be most productive. But these laws are not the same in all mineral districts. If, therefore, we remove from any of our most celebrated mining-counties one of its most experienced practical miners, and if we place him in another, where different laws, for the distribution of ore in veins prevail, and where, though minerals may be abundant, those laws are not yet known by experience, because no mines have yet been worked; all his practical knowledge acquired from observations in his native district will avail him nothing, perhaps will become absolutely injurious, because it will be likely to prevent his paying attention to the suggestions of those who have studied mineral veins on a more general scale. This study forms one department of Geology, and the mine-agent who possesses most of it, is most likely to conduct mining operations with success. A person of this kind is too often branded by the ignorant with the epithet 'theoretical,' whereas, he is in fact, the really practical man, because he concentrates and combines in himself the knowledge derived from the observations of all practical miners in every part of the world.

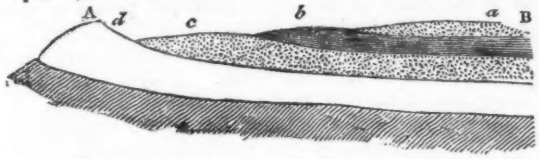
"The benefits which Geology can confer on agriculture are neither few nor trifling. Our limits will not permit us to point out in detail how the nature of a soil depends on that of the rocks from the disintegration of which it was derived, nor to show how particular plants affect particular soils, in which, in a state of nature, they exclusively flourish, and in which they flourish most in a state of cultivation, so that by consulting a good geological map, of a given district, we may predict, before we enter it, the species of crops which will be found most extensively cultivated there, and which experience has proved to be best adapted to it.

"A due mixture of the earths in a soil is essential to its fertility. The most productive districts of England have been made so by nature, and owe their fertility to this mixture; and it is by copying nature that we must proceed in our endeavours to improve those that are barren. Neither pure clay, sand, nor chalk, afford productive soils. Those are the best which contain a mixture of the three earths, silica, alumina, and lime, with a portion of decomposed animal and vegetable matter. These are the soils, so much coveted by the farmer, which will bear repeated cropping without manure. The principal ends proposed in agricultural improvements are, to render wet soils dry, and dry soils sufficiently moist; to render adhesive soils loose, and loose soils sufficiently adhesive; and the proportion in which the earths above mentioned should be mixed for these ends, must depend upon the climate and the substratum. Aluminous, or clayey, soils retain too much moisture, and siliceous, or sandy, soils part with it too rapidly; and a soil, good in itself, may be rendered unproductive by resting on too retentive or too porous a substratum. Draining or irrigation are in such cases the remedy. When one of the earths prevails in a soil to the exclusion of the others, great improvement may be effected by the addition of that which is deficient, and it is astonishing, as M. De la Beche has remarked, that the superior fertility observable along the line of junction of two rocks, occasioned by the mixture of their component parts, has not oftener induced agriculturists to have recourse to various artificial mixtures of the materials of rocks adjacent to each other. There are districts in which such mixtures have been practised with the greatest success; but, in general, farmers rely too exclusively on farm-yard manure. Clay, sand, and limestone, are, nevertheless, mineral manures of the greatest value, and have changed the face of whole districts that were before comparatively barren. By such mixtures the constitution of the soil has been improved,—causing the animal and vegetable manure afterwards applied to be more efficacious.

"The clay lands of Essex have been greatly improved by the use of chalk. This acts upon the land in several ways. It decomposes any free acids, and some acids in combination, naturally existing in the soil, and which are prejudicial to vegetation, and it acts mechanically, by rendering the soil more pervious to moisture, and affording greater facilities for the roots of plants to expand. When chalk is not at hand, a dressing of sand or fine gravel will produce some of these results, particularly if it contains calcareous matter, in the shape of fragments of limestone or shells. Clay, again, is equally efficacious on sandy soils, by increasing the power of the soil to retain moisture, and by enabling the roots to maintain themselves firmly in the ground.

"In Norfolk and Suffolk, vast tracts of land, which were before incapable of bearing corn, have, by the application of clay, been made to produce good crops of wheat, barley, clover, and turnips. Thus a greater number of cattle are kept upon a given area, and the quantity of animal and vegetable matter returned to the soil, is proportionably increased. The mineral manures are, in general, too much neglected, with the exception of lime (the injudicious use of which too often runs into the abuse), and even in those districts where they are applied, they are frequently brought from a distance, when, though not visible on the surface, they exist at a small depth below it, sometimes under the very field for the improvement of

which they are required. Now, who, we would ask, is most likely to discover them,—he who never looks deeper into the earth than the bottom of his ditches, or he who studies the position of rocks, with respect to each other, and for this purpose examines every natural section by which they are exposed to view in cliffs and ravines, and every artificial section laid open by mines, wells, and other excavations?



"Let A B, in the annexed diagram, represent the surface of a district composed, like some of the eastern parts of England, of strata of sand, clay, and gravel, resting upon chalk, all the strata having a slight inclination to the eastward, or towards B: a farmer cultivating the sandy soil at *a*, knows, for he observes it in riding to market, that at a certain distance from his own farm he shall cross a tract of clay, *b*, and that, after leaving that, he shall meet with sand and gravel again at *c*, and that at *d* he shall quit the plain and reach hills of chalk. But, he does not know, and he would probably laugh at the person who communicated the information, that all the strata *b*, *c*, and *d*, are to be found under his own land at *a*, at a depth proportioned to the thickness and inclination of the strata, so that a bed which, in one part of an estate will be at a considerable depth, may rise in another very near the surface. But these are points to the determination of which the geologist applies himself, and having ascertained, from the nature of the embedded fossils, that the stratum, *a*, is the crag, and *b* the London clay,—he knows that by proceeding in a direction contrary to that in which the strata dip, he shall meet with the sands and gravels of the plastic clay, as well as with the chalk, rising successively to the surface."

[Abridged from ZORNLIN'S *Recreations in Geology*.]

THE JACKALL AND HIS FRIENDS,

OR, THE SELF-PURVEYOR; A FABLE.

SOME men attain their selfish ends
By separating dearest friends.
The traveller, in his farthest range,
Ne'er met a company so strange,
As strolled along, one summer's day,
The forest green, in search of prey.
A Jackall led the motley crew,
As pioneer and steward too.
Next came a Tiger in his pride:
A gaunt Wolf followed with a stride.
A keen Ichneumon joined the throng,
With whom a small Mouse tripped along.
"Hush!" said the Jackall, "friends, prepare!
An Antelope stands grazing there:
On him we might most richly feed,
But then he beats us all at speed;
What's to be done to gain the prize?"
"Nay," said the Tiger, "you advise."
"Well, honoured Sir, the beast, I see,
Has lain him down 'neath yonder tree,
Our friend the Mouse here, I propose,
Should softly creep, and gnaw his toes;
Then when he halts, with pain distressed,
We'll trust to *you* to do the rest!
'Twas done. The Mouse, with coat of gray,
Wound through the grass his noiseless way,
And when the outstretched foot he found,
Struck to the quick a secret wound.
Swift on his feet the creature sprung,
But lo! his speed was all unstrung!
Then leaped the Tiger, with a roar,
And felled him to arise no more.
While his poor life ebbed fast away,
The brutes came round him where he lay.
"This," said the Jackall, "*is* a treat!
But, gentlemen, before you eat,
I pray you bathe, whilst I remain
To guard the carcase of the slain."
Forth to a stream the friends repair,
And make their due ablutions there.
"Now," thought the Jackall, "how shall I
Cheat each companion with a lie!
If for myself I keep this feast,
'Twill last me for a week at least."
First, to the Tiger, as he sped,
Refreshed and pleased, the robber said,
"O Sir, I heard the Mouse declare,
This victory here was *his* affair!
For what could you have done forsooth,
But for his sharp and dainty tooth!"
The Tiger turned about and frowned,
Then sought the wild woods with a bound,
Growling, "What Tiger ever deigned
To eat a meal a Mouse had gained!"
The hero gone, the work was short
With claimants of a meaner sort.
When the half-famished Wolf drew near,
The Jackall whispered in his ear,
"Sir Wolf, I tell you as a friend,
Yon Tiger wishes to contend
With all or any who dispute
His title to the slaughtered brute!"
"Is't so, dear Jackall! then adieu,
But *you'll* avoid the tyrant too!"
"Yes, yes, anon, I only wait
To save our comrades from their fate."
The Mouse arrived, expecting cheer,
"Hist!" said the Jackall, "fly for fear!
The Tiger's hungry; mind you that:
And what's a Tiger but a Cat!"
The poor Mouse, stealing fast away,
Saw no more daylight all that day.
Th' Ichneumon now approached alone,
To whom the thief, with altered tone:—
"If you, Sir, dare maintain a right
In th' Antelope, prepare to fight!"
"Not for the world!" th' Ichneumon cried;
"One loss I patiently abide,
The loss, when hungry, of a meal;
But wounds are difficult to heal;
Nor will I now expose my paw
To burns from violence or law."

Trust not a shrewd projector's plan,
Until you know and prove your man;
E'en then proceed with thoughtful care,
Lest, losing your invested *share*,
You mourn your labour, worse than lost,
Whilst knavery revels at your cost.

ON MILITARY DRILLING. II.

WHILE standing in the position of *attention*, even the eyes of the soldier are under the command and guidance of the officer. On the word "*Eyes right*," or "*Eyes to the right*," the eyes must be turned in that direction, but without any movement of the head. The reverse must be observed at the word "*Eyes left*," adn at "*Eyes front*" they must be brought back to the front. The principal use of this is in *dressing*, or forming into a perfectly straight rank, which is of course of great importance. This is done either *by the right*, or *by the left*, the word "*right dress*," or "*left dress*," being given. Every soldier then turns his eyes to the right or left, and moves forward or backward, till he can just see the face of the second man from him and no further; he is then exactly in line. In dressing by the right, the right flank stands still, and in dressing by the left, the left flank stands still; for it is evident that the flank by which the rank is dressed must govern the motions of all the rest, so that if he were to move, all the rest must move also.

In dressing, great care is taken that the recruits turn their eyes only, and not their bodies, shoulders, or even heads, and bending forwards or backwards must on no account be allowed; for if a man who was behind the line were to bring himself apparently into it, by bending forward, he would obviously be no longer *dressed* when he resumed his upright position. Neither is any sudden change of place allowed in dressing, but the body is brought to its place gradually, by a succession of very short quick steps, which do not derange the upright position of the body. The recruits are practised in this peculiar motion, by ordering the whole of them to *dress forward* or *backward* at once, and to continue such motion till they are told to halt.

The next thing which the recruit is taught, is to go through the *facings*, of which there are eight. Each facing consists of two motions, first, placing the feet in a peculiar position, and, secondly, turning round on the heels into the new direction, or *face*, which the body is to assume. The preparatory placing of the feet differs according to the nature of the turn, or face, to be made, but in this first movement the left foot remains steady: it is the right foot only which is drawn back more or less in all facings towards the right, and advanced in the facings towards the left. Between the two movements a short pause is always to be observed. But, in the case of recruits at drill, after the *first* movement has been made, the word "two" is given by the drill-officers, whereupon the facing is completed, and not till then. This remark applies to the first four facings.

1. "*Right face*" implies a turn of ninety degrees, or a quarter of a circle, towards the right; so that the body may be at right angles to its proper position. To effect this, the right foot is drawn back four or five inches, so that its hollow part may fit on the left heel: the toes are then lifted up, and the body passes smoothly and quickly round on the heels, which will be found closed in their proper position, when the turn or facing is completed.

2. "*Left face*" is a similar turn, but to the left instead of to the right. The right foot is therefore advanced as much as it was before drawn back, so that the heel may be placed in the hollow of the left foot. The turn is then made as before, but in the opposite direction.

3. "*Right half face*" is a turn equal to half that effected by a "*right face.*" The angle moved through is therefore forty-five degrees, or one-eighth of a circle, and the body then faces off in a diagonal direction. As this is but a very small turn, the right foot need only be slightly drawn back: about an inch is generally sufficient, and care must be taken that it be not drawn back too much, or the heels will not correspond after the turn is completed.

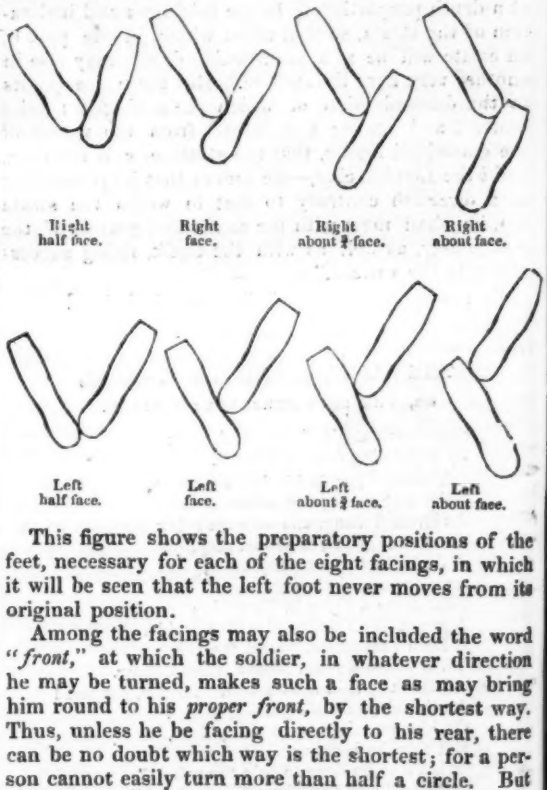
4. "*Left half face*" is just the reverse of the foregoing, and to effect it, the right foot must be *advanced* about an inch.

5. "*Right about face.*" This is a complete turn of half a circle, and it effects at once what would otherwise require two right faces. To prepare the feet for such a large turn, the right foot must be drawn back so much, that its toe may touch the left heel. At the word "two" the body must turn completely round to its rear, smoothly and without swinging, so as to preserve its balance. When this facing is completed, the heels will not be found closed in their proper position. This must therefore be done at the word "three," which constitutes a *third* motion, and between each of the three motions a sufficient pause is observed.

6. *Left about face.*" This facing is seldom used, as it effects just the same change of position as the last, but by turning to the left instead of to the right. The right foot is of course advanced as much as it was before drawn back.

7. "*Right about three-quarters face*" implies a turn equal to three-quarters of that effected by a *right about face.* It effects at once what would otherwise require a right face, and then a right half face. Perhaps the plainest way of illustrating all these facings is by reference to the eight principal points of the compass. Supposing a soldier to stand facing the north, a *right* or a *left about face* would carry him round so as to face the south. A *right face* would bring him to the east, and a *left face* to the west. A *right half face* and a *left half face* would respectively face the north-east and the north-west; and the *right about three-quarters face* would make him front to the south-east. To effect this last face the right foot must be drawn back more than for a right face, but less than for a right about; or so that the ball of this foot may touch the left heel. After having turned round the heels will not be found closed, but will require to be properly placed by a third motion, as in the right or left about face.

8. "*Left about three-quarters face*" is just the reverse of the last, and is effected by advancing the right foot so that its heel may touch the ball of the left foot, and then turning round in such wise that, if the face were before presented northward, it shall now face the south-west.



This figure shows the preparatory positions of the feet, necessary for each of the eight facings, in which it will be seen that the left foot never moves from its original position.

Among the facings may also be included the word "*front,*" at which the soldier, in whatever direction he may be turned, makes such a face as may bring him round to his *proper front*, by the shortest way. Thus, unless he be facing directly to his rear, there can be no doubt which way is the shortest; for a person cannot easily turn more than half a circle. But when the soldier is faced directly to his rear, the two ways of fronting (either by a right about or by a left about face) are both of the same length. In such a case it is a rule that on the word *front* being given, he must come to the *right* about.

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